DOE recognized the promise of this technology and sponsored basic research, including computer modeling of toughening mechanisms and fundamental studies of the interface between ceramics and the toughening agents. As the Yergin Task Force on Strategic Energy Research and Development pointed out in its June 1995 report, "This research not only surmounted the technological obstacles that led to commercialization, but is among the most highly regarded scientific work done worldwide on ceramics over the past decade."

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Coupled with the basic research, the Department sponsored applied research on toughened ceramics. One major success was the development of a new ceramic compound by one of its national laboratories in the early 1980's - silicon carbide whisker-reinforced alumina - now used in a wide variety of industrial applications, including metalworking die inserts and fastcutting machine tools. The current estimate of worldwide sales of products made of this innovative ceramic by U.S. companies is more than $30 million per year.

The Department's ongoing support for R&D on ceramics continues to yield important technological advances. One of these is gelcasting, a precision complex-shape-forming process that yields a near-net-shaped part requiring minimum machining. Another is a lightweight ceramic hot-gas filter material, used to remove hot gas particulates in fossil energy power generation and industrial systems, thus improving the efficiency and productivity of the parent system. Developed as part of a cost-shared collaboration between the Department of Energy and industry, the filter material has been licensed for commercial production and is estimated to have a potential international market of $7 billion over the next 10 to 15 years, with the U.S. market alone forecasted to reach $200 million annually by the end of the century.

DOE Computer Code Now in Use by 42 of the World's 50 Largest Chemical Companies

Modeling an energy or chemical process on a computer is a much more affordable way to try different process configurations prior to building or modifying actual plant hardware. Today one of the standard process simulation models in use by industry is the product of a DOE-funded development effort. In the late 1970s DOE funded the initial code for the ASPEN model at the Massachusetts Institute of